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⑭ 発明の名称 エンジンのスロットル弁制御装置

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## 明細書

## 1. 発明の名称

エンジンのスロットル弁制御装置

## 2. 特許請求の範囲

エンジンの吸気通路に配されるスロットル弁に関する設けられるアクセル操作部と、上記スロットル弁とアクセル操作部とを遮断する第1の状態と連結する第2の状態とを選択的にとる断続手段と、上記アクセル操作部の操作量を検出するアクセル操作量検出手段と、上記スロットル弁の開閉動作を行うアクチュエータと、上記アクセル操作量検出手段により検出される操作量に応じて上記スロットル弁を開閉させるべく、上記アクチュエータを駆動するアクチュエータ駆動手段と、上記アクチュエータ及びその制御系のうちの少なくとも一方の異常を検出する異常検出手段と、該異常検出手段により上記アクチュエータ及びその制御系の異常が検出されないとき、上記断続手段に第1の状態をとらせ、上記アクチュエータ及びその制御系のうちの少なくとも一方の異常が検出さ

れるとき、上記アクチュエータによる上記スロットル弁の開閉制御を中止させるとともに、上記スロットル弁が上記アクセル操作部の操作量に対応する開度状態となったとき、上記断続手段に第2の状態をとらせる制御手段と、を具備して構成されるエンジンのスロットル弁制御装置。

## 3. 発明の詳細な説明

## (産業上の利用分野)

本発明は、吸気通路に配されるスロットル弁を、アクセル操作部の操作量に応じてアクチュエータにより開閉するようにされたエンジンのスロットル弁制御装置に関する。

## (従来の技術)

自動車等に搭載されるエンジンの吸入空気量を調整するため、その吸気通路に配されるスロットル弁は、従来、アクセルペダル等から成るアクセル操作部の操作に機械的に連動して開閉するようになされているが、最近、それに代えてアクセル操作部の操作量を検出し、斯かる操作量に応じてスロットル弁をモータ等のアクチュエータにより

English Translation of

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[Abstract]

PURPOSE: To make an engine driving state correspondable to the manipulated variable of an accelerator final controlling element, by connecting the accelerator final controlling element to a throttle valve with a proper relation when trouble occurs in an actuator and its control system.

CONSTITUTION: When it is so judged that trouble occurs in a motor 22 or its control system, a control unit 100 waits such time when the manipulated variable of an accelerator pedal 36 comes to zero, that is, this pedal 36 is released, and stops the supply of a control signal to a solenoid coil 30 temporarily. With this stopping, a connected state between an accelerator link 28 and a clutch disc 16 is released free, while a throttle valve 12 is put back to a full-close state by elastic force of a return spring 34. Therefore, at this time, the manipulated variable of the accelerator pedal 36 and opening of the throttle valve 12 come to a corresponding something, so that the control unit 100 again feeds the solenoid coil 30 with the control signal, exciting this coil, and it connects the accelerator link 28 to the clutch disc 16.

**[Claim(s)]**

A throttle valve control unit for engine comprising,  
An accelerator operating member installed in conjunction with a throttle valve disposed by an aspiration passageway of an engine;  
a intermittent continuation means for selecting either the first state that said throttle valve and said accelerator operating member were intercepted or the second state that were coupled;  
a quantity of accelerator operation for detecting means detecting quantity of operation of said accelerator operating member;  
an actuator for opening and shutting said throttle valve;  
an actuator drive means for making drive said actuator ,to open and shut said throttle valve depending on quantity of operation detected by said quantity of accelerator operation for detecting means;  
an trouble detecting means for detecting trouble of either among said actuator or its control system at least;  
a control means for making said a intermittent means take said first state when it is not detected trouble of both said actuator and said control system, for making said a intermittent means take said second state with stopping open/close control of said throttle valve by said actuator when quantity of throttle valve aperture accords with quantity of accelerator operation, when it is detected trouble of either among said actuator or its control system at least

**[Detailed Description of the Invention]****[Industrial applicability]**

This invention relates to a throttle valve control unit of an engine opened or closed a throttle valve disposed by an aspiration passageway depending on quantity of operation of an accelerator operating member with an actuator.

**[Description of the Prior Art]**

A throttle valve disposed by the aspiration passageway works for operation of the accelerator pedal operating member that it is from accelerator pedals automatically, and it opens or closes to adjust quantity of inhalation air of an engine carried conventionally by cars. But, recently instead of it, Quantity of operation of an accelerator operating member is detected, an opening or closing throttle valve control unit is thought about depending on quantity of the operation with an actuator of motors of a throttle valve.

In this way a driving state of an engine and a run state of a vehicle are accepted not only it makes quantity of a throttle valve support quantity of operation of an accelerator operating member, and it is changed, and, according to the throttle valve control unit that a throttle valve was opened or closed with an actuator, it can be changed. Uniformity can do control to hold at control and run speed of a vehicle to hold idle RPM in aim RPM of an engine, for example, thereby.

When abnormality to be snapped in an actuator and the control system occurs in such a throttle valve control unit, and the situation that gets impossible to control a throttle valve appropriately occurred, it is necessary for and swiftness to take measures of what as opposed to it adequately.

Because of this, for example, in before, it makes an actuator do opening and shutting movement of a throttle valve when an actuator and the control system are normal in a state shown in Japanese Patent Laid-Open No. 59-153945 bulletin.

And when a trouble occurred in it, open/close control of a throttle valve is stopped to an actuator, and a connection is done automatically, and the throttle valve control unit which it makes a throttle valve link operation of an accelerator operating member after it, and was opened or closed is proposed with a throttle valve and an accelerator operating member by an electromagnetic clutch.

**[Problem to be solved by the invention]**

However, it is when a throttle valve was coupled with an accelerator operating member in the proposed throttle valve control unit when quantity of a throttle valve does not cope as against quantity of operation of an accelerator operating member. Therefore it is become when a driving state of an engine does not support quantity of operation of an accelerator operating member. By way of example only, though an accelerator operating member is left open, it might invite the situation that a throttle valve is not full-close state, and an idling state therefore to be reasonable is not provided.

Quantity of operation of an accelerator operating member is accepted with an actuator, and this invention opens or closes a throttle valve in view of the problem. And when a trouble occurred to an actuator and the control system, open/close control of a throttle valve with an actuator is stopped, and it is coupled with an accelerator operating member and a throttle valve, and operation of an accelerator operating member is accepted, and a throttle valve is opened or closed. Besides, when an accelerator operating member is coupled with a throttle valve ▼ it is directed to that a throttle valve control unit of the engine that appropriate relation is owned, and doing it is under is provided.

[Means for solving problem]

To solve the problem, a throttle valve control unit for engine concerning this invention comprising,

An accelerator operating member installed in conjunction with a throttle valve disposed by an aspiration passageway of an engine;

a intermittent continuation means for selecting either the first state that said throttle valve and said accelerator operating member were intercepted or the second state that were coupled;

a quantity of accelerator operation for detecting means detecting quantity of operation of said accelerator operating member;

an actuator for opening and shutting said throttle valve;

an actuator drive means for making drive said actuator ,to open and shut said throttle valve depending on quantity of operation detected by said quantity of accelerator operation for detecting means;

an trouble detecting means for detecting trouble of either among said actuator or its control system at least;

a control means for making said a intermittent means take said first state when it is not detected trouble of both said actuator and said control system, for making said a intermittent means take said second state with stopping open/close control of said throttle valve by said actuator when opening of said throttle valve accords with quantity of accelerator operation, when it is detected trouble of either among said actuator or its control system at least.

[Effect of the invention]

When, for the case a throttle valve control unit of constitution such as statement above, an actuator and a trouble of the control system are not detected a control means by a trouble detecting means ▼ it makes take the first state as intermittent continuation means. An accelerator operating member and a throttle valve are considered to be an interception state and quantity of operation detected by a quantity of accelerator operation detecting means is accepted and is made to open or close by this by means of the actuator that a throttle valve is driven by an actuator drive means.

On the other hand, when an actuator and our at least one trouble of the control system are detected by a trouble detecting means ▼ when a control means stopped open/close control of a throttle valve with an actuator, and a throttle valve became difference corresponding to quantity of operation of an accelerator operating member ▼ it makes take the second state as intermittent continuation means.

A driving state of an engine becomes a thing corresponding to quantity of operation of an accelerator operating member after, at a minimum, a trouble occurred in one among an actuator and the control systems a throttle valve is coupled with an accelerator operating member by appropriate relation by this and and a throttle valve works for operation of an accelerator operating member so that it is opened or closed.

#### [Example]

An example of the present invention is now described in conjunction with the accompanying drawings.

Figure 1 shows an example of a throttle valve control unit of an engine concerning the present invention along with one part of the engine which it was applied to.

In figure 1, throttle valve 12 is arranged in aspiration passageway 10 of an engine carried by a vehicle. Aspiration passageway 10 can rotate valve stem 12b, and throttle valve 12 is supported by valve disc 12a and valve stem 12b, and it is protruded for the both ends 9 quarters by the circumference side of passageway 10. Quantity of throttle valve aperture sensor 14 detecting quantity of aperture of throttle valve 12 is installed in one end side of valve stem 12b. On the other hand, in another end side of valve stem 12b, serration part 18 that clutch disk 16 is engaged is formed. Between a part and the end that serration part 18 in the another end side of valve stem 12b was formed, is coupled with clutch disk 16, and it and gear 20 rotating unitedly can rotate as against valve stem 12b, but ▼ is done decoration in the state that cannot move in the axial. Engaging ditch 20a which several engaging single 16a and it which were arranged in clutch disk 16 side circumferentially seem to be coped with, and was formed by gear 20 side is coupled with clutch disk 16 and gear 20. Clutch disk 16 is gone through, and gear 20 transmits drive gear 24 fixed to an axis of motor 22 considered to be an actuator opening or closing throttle valve 12 and fighting each other, driving force of motor 22 to throttle valve 12.

In addition, it is done decoration in the state that cannot move, and, however, the axial can rotate accelerator link 28 which one end of accelerator cable 26 to transmit an actuation force added to accelerator pedal 36 between part and aspiration passageway 10 where serration part 18 in the another end side of valve stem 12b was formed to throttle valve 12 was coupled with as against valve stem 12b. Solenoid coil 30 to couple clutch disk 16 with accelerator link 28 is installed in accelerator link 28, coil spring 32 to bias is comprised with clutch disk 16 between and accelerator link 28 and clutch disk 16 by gear 20 side. In addition, coil to make

throttle valve 12 an always closed state-shaped return spring 34 is disposed between accelerator link 28 and aspiration passageway 10.

Even more particularly, when accelerator pedal 36 was left open ▼ return spring 39 for the one end to abut with stopper 38 is comprised, it associates, and the accelerator sensor 40 it steps, and to detect quantity (quantity of operation) is installed in and accelerator pedal 36.

Control unit 100 is comprised to do opening and shutting movement of throttle valve 12 by motor 22 and clutch disk 16 and control with intermittent continuation means to be configured with the 30th class electromagnetic coil by this example as well as the constitution.

To control unit 100, detection signal St which accepted detection signal Sa which accepted quantity of operation of accelerator pedal 36 provided from accelerator sensor 40 and quantity of aperture of throttle valve 12 which it opens, and is provided from sensor 14 is supplied. And a driving state of an engine (the detection signal which, by way of example only, express RPM of an engine, cooling water temperature), a run state of a vehicle (the detection signal which, by way of example only, express a gear position of a speed varier installed in an engine, run speed of a vehicle) are supplied, even more particularly, other than those detection signal Sa and St, the voltage of battery 50 is applied therewith. Control signal Ca is formed, and it is supplied to motor 22, and the movement is controlled so that control unit 100 is based on those detection signal, and it is assumed that quantity of operation of accelerator pedal 36 was accepted with quantity of aperture of throttle valve 12. For this case, as for control unit 100, a driving state of an engine and a run state of a vehicle set aim quantity of aperture corresponding to quantity of operation of accelerator pedal 36 in a case in a normal state. And movement of motor 22 is controlled so that quantity of aperture of throttle valve 12 accords in this aim quantity of aperture. When, by way of example only, a constant speed run state is called for by time in an idling state or a vehicle, for this, a driving state of an engine makes quantity of aperture of throttle valve 12 is changed in an appointed range mainly on the aim quantity of aperture, and aim RPM converge with idol RPM of an engine. Or movement of motor 22 is controlled to maintain run speed of a vehicle to uniformity.

And when control such as for example statement above is done ▼ is determined that troubles such as disconnection, trouble produced control unit 100 in motor 22 or the control system configured from the 40th class accelerator sensor at the age of the following, for example.

Though it is detection signal Sa and the level that St is normal, when is surveyed land there not being quantity of aperture of throttle valve 12 in a predetermined range mainly on aim quantity of aperture, the time when that detection signal Sa or the level that St cannot take at normal time is taken is detected. And control signal

Cc to solenoid coil 30 is not supplied when it is determined that motor 22 or the control system is normal. When motor 22 or the control system is normal, clutch disk 16 is biased by coil spring 32 by gear 20 side, and gear 20 is coupled with clutch disk 16 by this ▼ FIG. 1 is in a condition.

On the other hand, it is assumed that it was determined that a trouble occurred in motor 22 or the control system, and at first control signal Cc is supplied to solenoid coil 30, and it is excited, and supply of control signal Ca to motor 22 is stopped along with it, and control unit 100 does it in a no load state. Accelerator link 28 and clutch disk 16 are coupled, and opening and shutting movement of throttle valve 12 by motor 22 is canceled along with it so that clutch disk 16 resists elasticity of coil spring 32, and it slides in consonance with the axial with serration part 18 of valve stem 12b, and accelerator link 28 are gone through, and it is held absorption to solenoid coil 30 as shown in figure 2 by this. As a result, an actuation force added to accelerator pedal 36 goes through accelerator cable 26, accelerator link 28 and clutch disk 16, and it is transmitted to throttle valve 12, and throttle valve 12 accepts quantity of operation of accelerator pedal 36 after a trouble produced, and it is opened or closed.

However, in this situation, it is so that it is when quantity of aperture of throttle valve 12 does not support as against quantity of operation of accelerator pedal 36 when a driving state of an engine does not cope with quantity of operation of accelerator pedal 36, and it is easy to be in erratic a run state of a vehicle. Because of this, as for control unit 100, quantity of operation of accelerator pedal 36 which detection signal Sa expresses next waits for a zero and time namely the time when accelerator pedal 36 is thrown open, and supply of control signal Cc to solenoid coil 30 is stopped temporarily. Accelerator link 28 and a coupling state with clutch disk 16 are removed by this, and it is returned to the state that throttle valve 12 completely closed by means of elasticity of return spring 34 (an idling state). Therefore, control signal Cc is supplied, and it is excited, and control unit 100 couples accelerator link 28 and clutch disk 16 with again solenoid coil 30 so that it is when quantity of of accelerator pedal 36 operation and quantity of aperture of throttle valve 12 support at this time. As a result, clutch disk 16 is coupled with accelerator pedal 36 by appropriate relation, and operation of accelerator pedal 36 can make it is when a driving state of an engine copes with quantity of operation of accelerator pedal 36, and run a vehicle in a stable state throttle valve 12 after it was coupled it works, and to open or close.

Controlling control unit 100 such as for example statement above (by way of example only, microcomputer is used, and it is configured) explains an example of the measures program that microcomputer in such a case carries out referring to a flow chart of figure 3.

By way of example only, when an ignition key was considered to be the ON status,

this program starts.

And after, by step 101, taking in detection signal Sa and St, step 102 is advanced to. Whether detection signal Sa and a level of St are as described before normal and though, by step 102, detection signal Sa and St take a normal level, in other words step 101 is come back to whether there is quantity of aperture of throttle valve 12 at an appointed range mainly on aim quantity of aperture when was determined that it is progress, the political situation to step 103 when was determined that a trouble produced by motor 22 and the control system.

By step 103, control signal Cc is supplied to solenoid coil 30, and supply of control signal Ca to motor 22 is stopped, and step 104 is advanced to. In other words it determines whether accelerator pedal 36 is liberated, and step 105 is advanced to whether quantity of operation of accelerator pedal 36 which detection signal Sa expresses is beginning by step 104 when it was determined that accelerator pedal 36 is liberated. When it was determined that accelerator pedal 36 is not liberated, the judgment is done repeatedly, till it is judged that accelerator pedal 36 was liberated.

Supply of control signal Cc to solenoid coil 30 is stopped by step 105, and in other words it is determined whether quantity of aperture of throttle valve 12 which detection signal St expresses is a thing corresponding to quantity of operation of accelerator pedal 36 by step 106 whether throttle valve 12 is in the state that completely closed.

When it was judged to be the state that throttle valve 12 completely closed, step 107 is advanced to. When it was judged not to be the state that throttle valve 12 completely closed, the judgment is done repeatedly, till it is determined that throttle valve 12 was completely considered to be the state that closed.

And after having supplied control signal Cc to solenoid coil 30 by step 107 again, the movement is finished. After, by this, a trouble occurred to motor 22 or the control system, it is put, and accelerator pedal 36 and quantity of aperture of throttle valve 12 become a thing corresponding to quantity of operation of accelerator pedal 36.

In addition, when, in the example, that a trouble occurred to motor 22 or the control system is detected, open/close control of throttle valve 12 by motor 22 is stopped with what couple accelerator pedal 36 with throttle valve 12. When the trace, accelerator pedal 36 were liberated, throttle valve 12 and a connection with accelerator pedal 36 are solved temporarily, and the state that completely closed by means of return spring 34 waits for what is done, and throttle valve 12 couples throttle valve 12 and accelerator pedal 36 again. However, a throttle control unit of an engine concerning the present invention does not have to be always considered to be in this way. The important thing is when a trouble occurred to a motor or the control system, open/close control of a throttle valve by a motor is stopped. When

quantity of operation of an accelerator pedal is become afterwards when quantity of aperture of a throttle valve supports, if an accelerator pedal seems to be coupled with a throttle valve, and is done, it is preferable.

In addition, in the example, a motor is used as an actuator, but, an actuator is not limited to a motor. A thing operating by means of other fluid pressure may be used. Even more particularly, throttle valve 12 is coupled with motor 22 and either of accelerator pedal 36 by means of clutch disk 16 and intermittent continuation means comprising of the 30th class electromagnetic coils, and, however, in the example, it is not limited to such a constitution. By way of example only, as is shown in the above-mentioned bulletin, it may be done in an always coupling state with a throttle valve and an actuator an accelerator pedal is intercepted by intermittent continuation means selectively or and it is coupled with a throttle valve.

#### [Effect of the invention]

It is clear from the above-mentioned explanation, but ▼ when a trouble produced to an actuator and the control system in a throttle valve control unit of an engine concerning the present invention and when it opened, and quantity of operation of an accelerator operating member was in a condition a throttle valve ▼ an accelerator operating member and a throttle valve are appropriate so that an accelerator operating member and a throttle valve seem to be coupled, and is done ▼-affiliated, is coupled. When a trouble produced to an actuator and the control system in a throttle valve control unit of an engine concerning the present invention and when it opened, and quantity of operation of an accelerator operating member was in a condition a throttle valve to be clear from the above-mentioned explanation ▼ an accelerator operating member and a throttle valve are appropriate to make couple an accelerator operating member and a throttle valve ▼-affiliated, is coupled.

Because of this, according to a throttle valve control unit concerning the present invention, one can make a trouble produces, and quantity of operation of an accelerator operating member is accepted, and open or close a throttle valve adequately among an actuator and the control systems at least. As a result, one can make a driving state of an engine cope with quantity of operation of an accelerator operating member among an actuator and the control systems at least after a trouble produced, and it can make run a vehicle in a stable state.

#### [Brief description of drawings]

Figure 1 is a schematic illustration to show along with one part of the engine that it was applied to an example of a throttle valve control unit of an engine concerning the present invention.

Figure 2 is a part constitution figure offered for the movement explanation shown in figure 1 in question.

Figure 3 is a flow chart showing an example of the program that the

microcomputer when microcomputer was used by a control unit shown in figure 1 carries out.

- 12 throttle valve
- 14 Quantity of throttle valve aperture sensor
- 16 clutch disk
- 20 gear
- 22 motor
- 24 drive gear
- 26 accelerator cable
- 28 accelerator link
- 30 electromagnetic coil
- 34 return spring
- 36 accelerator pedal
- 40 accelerator sensor
- 100 control unit

FIG. 1

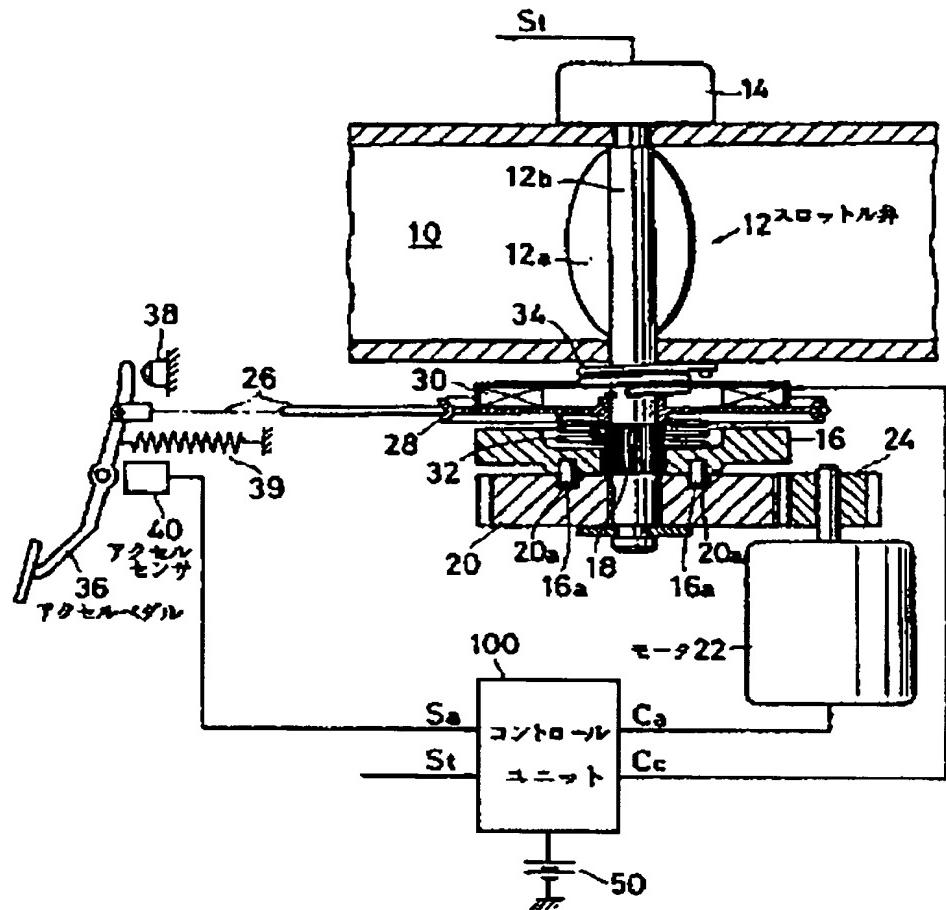


FIG. 2

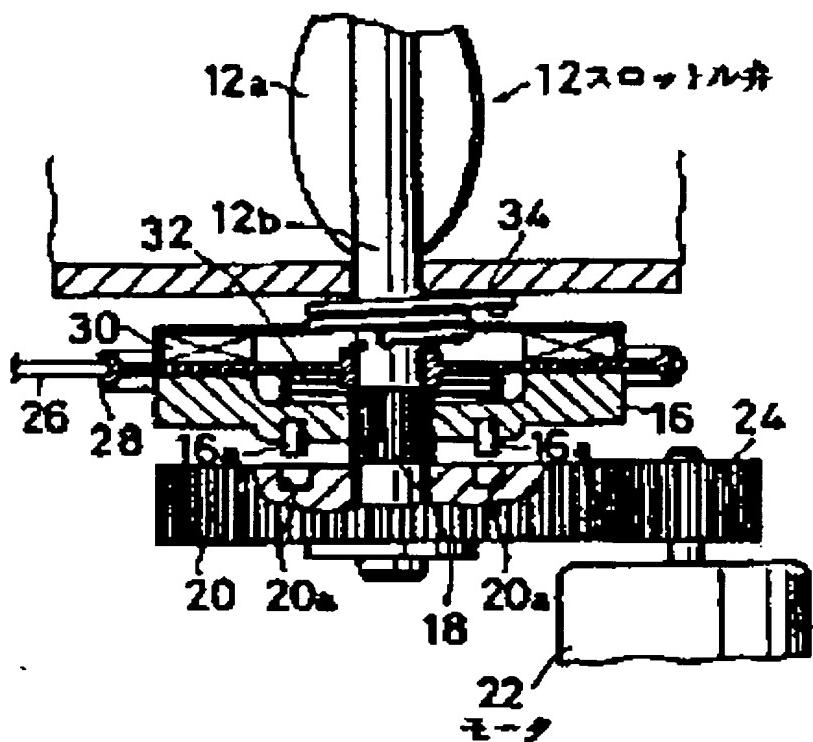
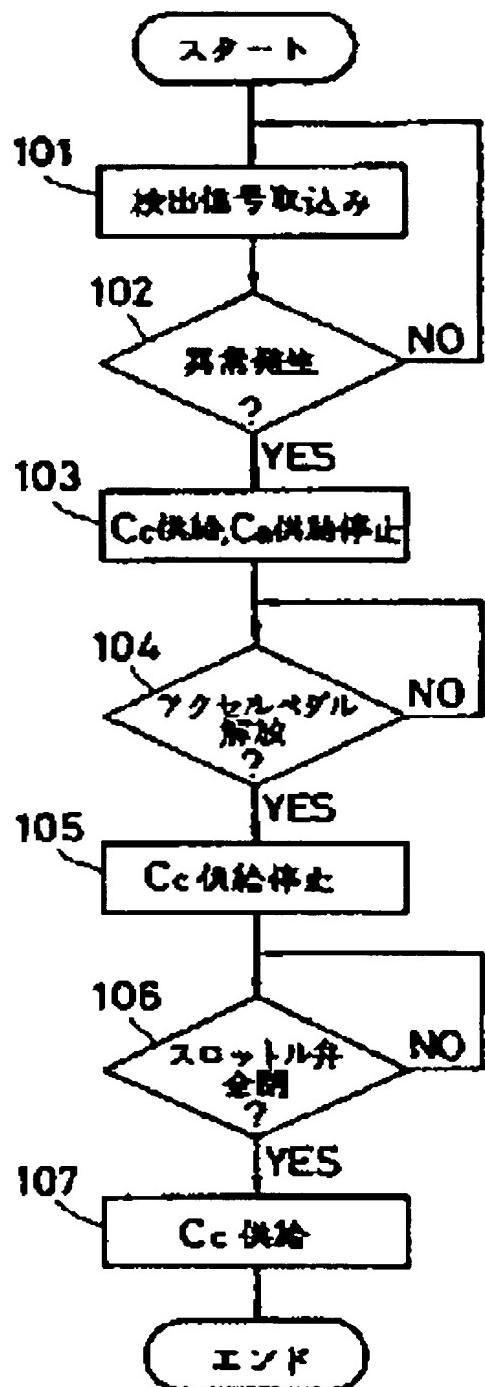


FIG. 3



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